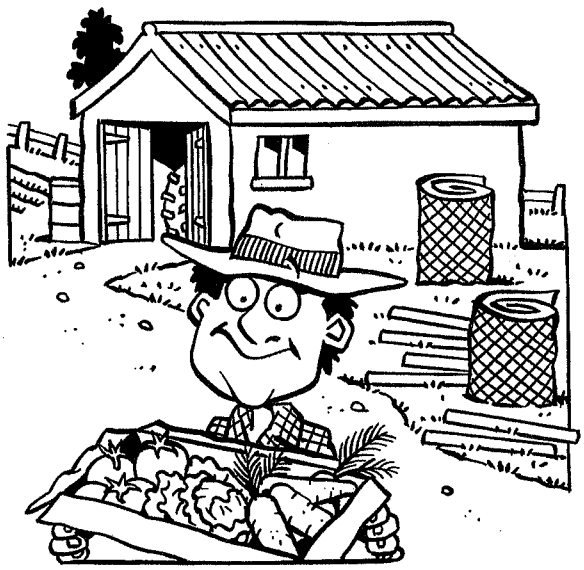
Technology task—Excel

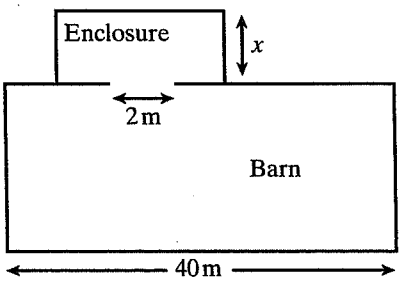
Farmer Sprout's fence

Name: ..... Due date: ...../...../.....

Farmer Sprout wishes to create a rectangular enclosure outside his barn, using the barn wall as one side of the enclosure and fencing as the other sides. Entry to the enclosure will be through a door in the barn wall. He wants to use exactly 50 m of fencing.



1 The diagram below shows Farmer Sprout's plan for the enclosure.



a What must the total length of the fence be?

b How many sides does the enclosure have?

c Let x represent the width of the enclosure. What is the length of the enclosure if $x = 10$ m?

d Is it possible to have an x value of 13.26 m? Explain. If so, what would be the length of the enclosure for this width?

e Write an expression for the length of the enclosure if the width is x m. Remember to specify the units.

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2 [To add borders to a table in Excel select the table cells, right-click, choose Format cells and open the Borders tab.]

Now create a table of possible dimensions for this enclosure in Excel.

- Open a new spreadsheet and set up the table using the headings as shown below. Enter widths of 1.0 m to 26.0 m in column C.

	C	D
3	**Possible enclosure dimensions**	
4	**Width, *x* (m)**	**Length (m)**
5	1.0	
6	2.0	

- To save time, enter your expression for the length of the enclosure in cell D5. Remember to type 'C5' instead of the x and use '*' for multiply. Use the fill handle ▭ to copy the formula down. (Alternately, you can work out the corresponding lengths and enter them individually.)
- Highlight the values in column C and D, right-click, choose **Format cells** and set the **Category** to **Number** and number of decimal places to '1' on the **Number** tab.

a If you can, print out your spreadsheet and paste it in the space below.

b Looking at Farmer Sprout's plan in **1** and the dimensions of the enclosure in your table, would it be practical to build an enclosure with a width less than 5 m? Explain.

c Is it possible to build an enclosure with a width of 24 m? If so, is it practical?

d Comment on the lengths you obtained for widths of 25 m and 26 m. What do they mean?

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3 For the remainder of this investigation you will consider enclosures with widths in the range 6.0 m to 20.0 m.

a Calculate the area of the enclosure for $x = 6.0$ m. Hint: You have the dimensions in your spreadsheet in **2**.

b Write an expression for the area of the rectangular enclosure using your answers from **1**.

c By substituting $x = 6.0$ m into your expression in **3b**, show that the area obtained is the same as in **3a**.

- Make a copy of the current sheet by right-clicking the 'Sheet 1' tab at the bottom of the screen. Choose **Move or copy** and check the **Create a copy** box. You should now have two sheets, 'Sheet 1' and 'Sheet 1(2)'. Rename 'Sheet 1(2)' by double-clicking on the tab. Call it 'Area'. Rename 'Sheet 1' as 'Dimensions'.
- Now highlight the rows of your spreadsheet containing widths of 1.0 m to 5.0 m, right-click and **Delete**. Also delete the rows containing widths of 21.0 m to 26.0 m. This leaves just dimensions for enclosures with widths of 6.0 m to 20.0 m.
- Now add an 'Area' heading and column to your table as shown below.

[To write m^2 in Excel, expand the **Font** tab and check the **Superscript** box on the **Format cells** menu, under **Format** tab.]

	C	D	E
3	**Possible enclosure dimensions**		
4	**Width, *x* (m)**	**Length (m)**	**Area, *A* (m^2)**
5	6.0		
6	7.0		

- To save time, enter your expression for the area of the enclosure in cell E5. Remember to type 'C5' instead of the x and use '*' for multiply. Use the fill handle to copy the formula down. (Alternately, you can work out the corresponding areas and enter them individually.)
- Format the area values as numbers to 1 decimal place. Paste a copy of your spreadsheet in the space below.

d How does the area change as the value of x increases?

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e Looking at the values in your table, estimate the maximum possible area for the enclosure to the nearest tenth of a square metre.

f What are the dimensions of the enclosure with the maximum possible area?

g Make a sketch of the barn and your enclosure in the space below. Mark on the dimensions of the enclosure.

Try this!

What if Farmer Sprout starts with 30 m of fencing instead of 50 m? Create a spreadsheet like the one in **3d** for widths between 4.0 m to 13.0 m. Estimate the maximum area that can be enclosed and the dimensions of that enclosure. Paste a copy of your spreadsheet in the space below.

Student comment	Guardian comment/signature	Teacher feedback

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